Package ‘SUE’

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Author Jim Yi
Maintainer Jim Yi <yijinpeng@live.cn>
Description This is a package for the subsampling method of robust estimation of linear regression models
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Description

This is a package for the subsampling method of robust estimation of linear regression models.

Details
**parameters**

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Type:    Package  
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License: GPL-2

**Author(s)**

Jim Yi

Maintainer: Jim Yi <yijinpeng@live.cn>

**Description**

This function computes the main parameters of the subsampling method. The values it returns are needed in following computing process of the function `sue.1m`.

**Usage**

`parameters(n, ns, a = 0.1, E = 0.99, p = 0.99, method = "default")`

**Arguments**

- `N`  
  The number of observations of a sample

- `ns`  
  The subsample size

- `a`  
  The proportion of contamination

- `E`  
  The desired efficiency

- `p`  
  The probability of having at least r* good subsamples

- `method`  
  The options to generate parameters in different mechanisms

**Value**

- `ns`  
  The subsamples size

- `r`  
  The number of subsamples to be combined

- `k`  
  The total number of subsamples to be generated

**Author(s)**

Jim Yi
Examples

```r
# Generate parameters of the data with N=50 observations
parameters(50)

# Generate parameters using method="small.k"
parameters(50, a=0.2, method="small.k")

# Generate parameters using method="appro.k"
parameters(50, a=0.05, method="appro.k")
```

SUE.fitted.values  

Fitted Values of SUE.lm Fits

Description

Computes fitted values of a fit SUE.lm model.

Usage

```r
SUE.fitted.values(fit)
```

Arguments

- `fit`  
  An object of class SUE.lm, typically the result of a call to SUE.lm

Author(s)

Jim Yi

Examples

```r
# See examples of the function SUE.lm
```

SUE.lm  

The Subsampling Method for Linear Regression

Description

This function computes the subsampling method estimators for linear regression.

Usage

```r
SUE.lm(formula, data = list(), k, ns, r, constant = 0.25, consistency.check = TRUE)
```
Arguments

formula: it is an object that indicates the variables used in the regression. A formula object has the form \( y = x_1 + x_2 + ... + x_p \), where \( y \) is the name of the dependent variable, and \( x_1, ..., x_p \) are the names of the explanatory variables.

data: This argument is used only if the variables belong to a data frame, in which case data is the name of the data frame.

k: It is the total number of subsamples to be generated.

ns: It is the subsample size.

r: It is the number of subsamples to be combined. The function parameters is especially designed to compute these three parameters of subsampling method.

constant: is a predetermined parameter which is used to control the distance between two estimated values. It only works under the condition that consistency.check = "TURE". The default value is 0.25. However, users can try different values to get better result. What has to be mentioned is that: if the value is set too small, the function will fail the consistency check easily which result in running the program for many more times, but if the value is too large, the result may be not reliable. It is user’s job to balance these situations.

consistency.check: The argument decides if we conduct consistency check. The default value is TURE. We highly recommend to always check the consistency of the result after computing. It can sufficiently increase the reliability of subsampling method.

Value

Apart from the same output components as the object of class "lm", such as coefficients, residuals and fitted.values, the main components of the output are:

combined.sample: is the final combined sample generated by the subsampling method. It is supposed to be the fine data without outliers.

sample.size: is the sample size of the combined sample, which is convenient for user to compute the number of outliers.

mse: They are MSEs of the regressions of \( r \) chosen subsamples.

beta: They are coefficient parameters of the regressions of \( r \) chosen subsamples.

check: It is a logistic output which indicates whether the subsampling method fails the consistency check or not.

Author(s)

Jim Yi

Examples

We analysis the well known stackloss data by using ordinary linear method and the subsampling method.

We also try two m values, \( m = 2 \) and \( 4 \), which represent roughly 10\% and 20\% working proportion of outliers in the data. The subsample size is chosen to be the default size of \( ns = 11 \).
data(stackloss)
a1=lm(stack.loss~Air.Flow+Water.Temp+Acid.Conc.,data=stackloss)
a2=SUE.lm(stack.loss~Air.Flow+Water.Temp+Acid.Conc.,data=stackloss,k=57,ns=11,r=6,
    consistency.check=TRUE,constant=0.25)
a3=SUE.lm(stack.loss~Air.Flow+Water.Temp+Acid.Conc.,data=stackloss,k=327,ns=11,r=5,
    consistency.check=TRUE,constant=0.25)
par(mfrow=c(2,2))
plot(a1$fitted.values,a1$residuals,xlab="(a) fitted values",ylab="residuals",ylim=c(-12,12))
abline(h=0)
abline(h=9.7,lty=2)
abline(h=-9.7,lty=2)
plot(SUE.fitted.values(a2),SUE.residuals(a2),xlab="(b) fitted values",ylab="residuals",ylim=c(-12,12))
abline(h=0)
abline(h=9,lty=2)
abline(h=-9,lty=2)
plot(SUE.fitted.values(a3),SUE.residuals(a3),xlab="(c) fitted values",ylab="residuals",ylim=c(-12,12))
abline(h=0)
abline(h=3.75,lty=2)
abline(h=-3.75,lty=2)

SUE.plot

Plot for "SUE.lm" Objects

Description

Fitted.values vs residuals plot for "SUE.lm" Objects

Usage

SUE.plot(fit)

Arguments

fit An object of class SUE.lm, typically the result of a call to SUE.lm

Author(s)

Jim Yi

Examples

## We analysis the well-known stackloss data by using the subsampling method.

data(stackloss)
a=SUE.lm(stack.loss~Air.Flow+Water.Temp+Acid.Conc.,data=stackloss,k=57,ns=11,r=6,
    consistency.check=TRUE,constant=0.25)
SUE.plot(a)
### Description

Computes residuals of fit `SUE.lm` model.

### Usage

```r
SUE.residuals(fit)
```

### Arguments

- `fit`: An object of class `SUE.lm`, typically the result of a call to `SUE.lm`

### Author(s)

Jim Yi

### Examples

```r
# See examples of the function `SUE.lm`
```
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